THE LEHIGH UNIVERSITY.

FOUNDED BY ASA PACKER.

COURSE IN

CIVIL ENGINEERING.

MANSFIELD MERRIMAN, C.E., Ph.D.,
Professor of Civil Engineering.

SOUTH BETHLEHEM, PA.
1896.

THE LEHIGH UNIVERSITY.

THOMAS MESSINGER DROWN, LL.D., President.

WILLIAM H. CHANDLER, PH.D., F.C.S., Professor of Chemistry.
BENJAMIN W. FRAZIER, A.M., Professor of Mineralogy and Metallurgy.
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WILLIAM C. THAYER, A.M., Professor of the English Language and Literature.

ALEXANDER MACFARLANE, M.A., D.SC., LL.D., Lecturer in Charge of Department of Electrical Engineering.
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PRESTON A. LAMBERT, M.A., Instructor in Mathematics.
JOSEPH W. RICHARDS, M.A., A.C., PH.D., Instructor in Metallurgy and Mineralogy.
LEWIS BUCKLEY SEMPLE, M.A., PH.D., Instructor in English.
RALPH M. WILCOX, PH.B., Instructor in Civil Engineering.
JOHN P. BROOKS, M.S., Instructor in Civil Engineering.
PROSSER HALL FRYE, A.B., Instructor in English.
ROBERT FERGUSON, A.B., Instructor in Modern Languages.
FREDERIC C. BIGGIN, B.S., Instructor in Drawing and Architecture.
FREDERICK W. SPANUTIUS, M.S., Instructor in Qualitative Analysis, Industrial Chemistry, and Assaying.
WILL B. SHOBER, PH.D., Instructor in Chemical Philosophy, Microscopy, and Organic Chemistry.
HERMAN EUGENE KIEFER, A.C., M.S., Instructor in Geology and Lithology.
JOSEPH BARRELL, B.S., E.M., Instructor in Mining and Metallurgy.
ROBERT C. H. HECK, M.E., Instructor in Mechanical Engineering.
J. GRANT CRAMER, A.M., Instructor in Modern Languages.
SAMUEL L. G. KNOX, M.E., Instructor in Mechanical Engineering.
HARRY M. ULLMANN, A.B., PH.D., Instructor in Qualitative Analysis.
J. HENRY KLINCK, M.E., Instructor in Electrical Engineering.
HENRY STORRS WEBB, B.S., Instructor in Electrical Engineering.
JOHN HUTCHESON OGBURN, C.E., Instructor in Mathematics and Astronomy.

SCHUYLER STEVENS CLARK, S.B., Assistant in Physics.
NATHANIEL THURLOW, A.C., Assistant in Chemistry.
WILLIAM H. HOFFMAN, B.C.E., Assistant in Civil Engineering.

I. PROGRAM OF STUDIES OF THE

COURSE IN CIVIL ENGINEERING.

FRESHMAN YEAR.

Solid Geometry. (3)	Trigonometry and Mensuration. (2)
Plane Trigonometry. (1)	Algebra. (3)
Chemistry. (3)	Construction. (2)
German or French. (3)	Projection Drawing. (3)
Freehand Drawing. (2)	German or French. (3)
Physiology and Health. (1)	English and Essays. (2)
English and Essays. (3)	

SOPHOMORE YEAR.

Analytical Geometry. (5)	Differential & Integral Calculus. (4)
Physics. (2)	Mechanics. (2)
Physical Laboratory. (2)	Physics (3)
Architectural Drawing. (3)	Land Surveying. (4)
German or French. (2)	German or French. (2)
English and Essays. (2)	English and Essays. (2)

JUNIOR YEAR.

Calculus & Analytical Mechanics. (2)	Railroad Surveying. (4)
Strength of Materials. (4)	Roofs and Bridges. (4)
Construction. (3)	Sanitary Engineering. (3)
Topographic Surveying. (3)	Mineralogy. (3)
Crystallography. (2)	German or French. (2)
German or French. (2)	English. (1)
English. (1)	

SENIOR YEAR.

Descriptive Astronomy. (3)	Roofs and Bridges. (3)
Bridge Design (7)	Hydraulics (3)
Geodetic Surveying. (2)	Electric Railways. (2)
Mechanics of Machinery. (2)	Geology. (3)
Lithology. (2)	Christian Evidences (1)
Practical Astronomy. (2)	Preparation of Thesis. (4)

The terms are of equal length, and the numbers indicate exercises per week.

II. History and Plan.

Hon. Asa Packer, of Mauch Chunk, Pa., announced his intention, in the autumn of 1864, of founding an educational institution in the Lehigh Valley. The first meeting of the board of trustees was held on July 27, 1865; a charter of incorporation was granted by the Legislature of Pennsylvania on February 9, 1866; the Lehigh University was formally opened on September 1, 1866; and the first class of three men was graduated on June 24, 1869.

It was the intention of Judge Packer in founding the University to afford young men the opportunity of an education for those professions represented in the development of the resources of the Lehigh Valley. In pursuance of this plan the course in Civil Engineering was one of the first outlined and organized. From 1868 to 1871 H. Stanley Goodwin, later Chief Engineer of the Lehigh Valley Railroad, had charge of the practical work of the course. From 1871 to 1881, a Professor of Civil and Mechanical Engineering had charge of the two departments, which were then closely allied; Charles McMillan, C.E., filled this chair from 1871 to 1875; A. J. DuBois, C.E., Ph.D., from 1875 to 1877; S. R. Crumbaugh, M.A., from 1877 to 1878; and Mansfield Merriman, C.E., Ph.D., from 1878 to 1881. In 1881 separate chairs of Civil and Mechanical Engineering were established, Professor Merriman being appointed to the former, which position he has held until the present time.

The general plan of the Course in Civil Engineering, as shown by the program of studies on page 3, is a broad one, including literary, scientific, and technical subjects. Its aim is not only to give young men a practical preparation for engineering work, but to secure their mental development so as to render them capable of attacking with confidence any problem that may arise in the actual practice of their profession. He who wishes to build high must first build broad, and the plan of this Course and its methods of instruction are so arranged that every student who well and truly does its work may have

a reasonable expectation of rising to a high and honorable position among engineers.

During the past quarter of a century engineering education has developed with long and rapid strides. It is believed that the Course in Civil Engineering in Lehigh University has not only kept up with the progress of this development, but that in some instances it has been one of the leaders in the movement. As examples of changes that have been made in the program of studies during the past twenty years the following may be noted: Construction, including the properties of materials, masonry, carpentry, roads and pavements, has been transferred from the Senior to the Freshman year; Stone Cutting from the Senior to the Sophomore year; Railroad Surveying from the Senior to the Junior year; Bridge Design and Sanitary Engineering have been introduced and developed; while the courses in Hydraulics and Strength of Materials have been greatly extended and improved. This technical progress has not been at the expense of literary or scientific subjects; on the contrary, students are now far better trained in these than ever before. Moreover, in all branches great progress has been made in thoroughness of instruction.

III. Fundamental and General Subjects.

During the Freshman and Sophomore years instruction in Chemistry, Physics, Mechanics, and pure Mathematics is given. These subjects are common to all the engineering courses, and form the foundation for all the subsequent technical work. They are taught for their uses rather than for mere mental discipline, but it is a remarkable circumstance that this point of view gives to the student greater zeal, keener perception, and more thorough training of mind than was possible under the old methods.

Instruction in English is given throughout three years of the Course. It includes rhetoric, lectures and readings in English literature and much practice in essay writing. The great importance to an engineer of a ready command of his own language can scarcely be overestimated, and it is the aim of the

Department of English to secure this both in writing and speaking.

Students in Civil Engineering may take either German or French, the former being recommended as likely to be the more useful. While only one of these languages is required, the opportunity of taking both is afforded, for it may safely be said that a young man cannot hope to become eminent in his profession without a knowledge of both German and French. During the Junior year conversation classes in both languages are open to all students.

In order that students may not neglect the proper care of their health, a course of lectures on Physiology and Hygiene is given during the first term of the Freshman year. A physical examination of each student is made at the beginning of both Freshman and Sophomore years, and proper exercise is prescribed and required in the Gymnasium for two hours per week during those years.

IV. Drawing.

During the Freshman year there is a course in free hand sketching and lettering, this being followed by tracings, projection drawing, descriptive geometry, and isometrics. Neatness and accuracy are insisted upon from the beginning, while rapidity is regarded as of equal importance. Much attention is paid to lettering, the aim being that students shall acquire a knowledge of the proper proportions of the best styles, have some artistic taste in regard to the arrangement of titles, and waste no time in unnecessary display.

In the first term of the Sophomore year there is a course in Architectural Drawing, with particular reference to masonry constructions. Plans are drawn of wing walls, piers and arches, which involve problems of stone cutting or stereotomy, these being made to a large scale and dimensioned. Measurements and sketches are made of actual structures for some of these drawings, while the data for others are assigned. In this term also the use of water colors is taught.

During the remainder of the Course there is constant work

in drawing in connection with the subjects of Surveying and Bridge Design which will be described below. It is the aim that every student shall become a neat, accurate and rapid draftsman, and it is believed that this is generally realized.

V. Surveying.

The work in Surveying extends over four terms and includes Land and Town Surveying, Topographic Surveying, Railroad Surveying, and Geodesy. After becoming acquainted with the theory and methods of computation the students go into the field and make actual surveys, from the notes of which maps are drawn. The plate accompanying this pamphlet shows the topographic map drawn by the Junior class in 1890, it being, however, much reduced in size, while a few additions and alterations have been made in order to correctly show the University Park at the present date. The area of this Park is about 40½ acres which is a somewhat smaller area than is generally covered by the Junior topographic survey.

In Railroad Surveying the students make preliminary locations upon a contour map, then run them out in the field and take the topography in detail, thus enabling a close estimate of each line to be prepared and the most economic location to be ascertained. Maps, profiles, and estimates of cost are prepared for both the preliminary and final location.

In Geodetic Surveying the theory includes lectures upon the figure of the earth and the elements of the method of least squares. The field work is mainly devoted to triangulation work of a high order of precision, but also embraces the use of the sextant and solar transit, together with the determination of systematic errors of instruments. Base lines have been measured by classes with a probable error, or uncertainty, of less than one part in 400,000, and horizontal angles with a probable error of less than one second of arc. Practical geodetic work in the observatory is also given by the Department of Astronomy.

A large collection of transits and levels enables the student to become acquainted with instruments of different makers,

those represented being Brandis, Buff and Berger, Draper, Fauth, Gurley, Heller & Brightly, Knox and Shain, Kübler and Seelhorst, Queen, Würdemann, Young, and Zentmayer.

VI. Construction and Materials of Engineering.

In the Freshman year lectures or recitations are held on the materials and general methods of civil engineering construction, including carpentry, masonry, roads and pavements, architectural styles, and the history of engineering. In connection with this course visits of inspection to structures are made, and measurements and sketches taken, the latter being afterwards more carefully redrawn and shaded. The sketches of the Freshman class in 1896, included rubble and squared masonry, a segmental arch, mortice and tenon joints, fished and scarfed joints, a king post truss, riveted boiler joints, a railroad switch, retaining walls and piers, details of bridge truss, and the ground plan of a building. The following is the examination paper given in this course on June 14, 1895:

1. State the properties of sandstone, limestone, and granite.
2. Explain, with sketch, the operation of a puddling furnace.
3. Define steel; open-hearth steel; Bessemer steel; mild, medium, and hard steel; annealed steel.
4. Sketch English bond, Flemish bond, coursed rubble, and drafted stone.
5. Give a sketch showing the principle of the stone crusher.
6. Give, with sketches, the arrangement of a Belgian pavement, and of a granite block pavement.
7. Compare wooden, brick, and asphalt pavements, with respect to cost, cleanliness, durability, and convenience to traffic.
8. Give the history of railroads in England prior to 1830.
9. Sketch part of the masonry of the Hokendauqua bridge, stating what part, and giving principal dimensions. [This bridge was inspected by the class.]
10. Sketch a Doric, an Ionic, and a Corinthian column.
11. Give a brief history of the obelisk in Central Park, New York.
12. Compare the rusting of cast iron and wrought iron.
13. Give your detailed estimate of the cost of the path recently constructed in the University Park.

In the Junior year a more extended course in Construction is given which embraces the topics of cements and mortars, pile driving, foundations, tunnels, canals, and some features of bridge construction. Visits of inspection are also made,

and written reports upon them are required. All the standard tests of hydraulic cements and mortars are made in the testing laboratory by each student.

The above general courses in Construction are supplemented by special lectures given in connection with the subjects of Railroad Surveying, Sanitary Engineering, and Bridge Design. The classes are also able to visit frequently works in the course of construction in the Lehigh Valley.

The theory of the Strength of Materials, including the elasticity and resistance of timber, brick, stone, and metals, and the investigation of stresses in beams, columns and shafts, comes also in the Junior year. Numerous practical problems are assigned to exemplify the theory, and many diagrams and sketches are required. Each student makes tensile and flexural tests of timber and metals. The laboratory of the Bethlehem Iron Company also affords constant opportunity for students to become acquainted both with common commercial tests and the refined scientific ones required by the ordnance departments of the United States Army and Navy.

VII. Sanitary and Hydraulic Engineering.

This work is begun during the Junior year by lectures and recitations on water-supply and sewerage. The collection, purification and distribution of water is treated at length, general principles and methods being exemplified by descriptions of constructed works and by visits to those in the neighborhood. House drainage, the separate and the combined systems of sewerage, the disposal and utilization of sewage with due regard to the best modern practice, are discussed at length. During the present year several valuable lectures on chemical and biological analyses of water, and on the filtration of water and sewage, have been kindly given by the President of the University. The following examination paper, given to the class in June, 1895, will indicate the character of the detail work in this subject:

1. Describe the sanitary system of the ancient Israelites.

2. State the meaning in water analyses of free ammonia, albuminoid ammonia, chlorine, nitrates, and bacteria.

3. Describe methods of purifying water by æration.
4. Describe the method of purifying water by filtration at Antwerp.
5. Give a cross-section, with dimensions, of an earthen embankment for a reservoir, the water to be 18 feet deep.
6. Define the duty of a pumping-engine; what is the advantage and the disadvantage of a high duty?
7. State three methods of preventing water waste.
8. Sketch the wash-out closet and the hopper closet.
9. State the size, material and kind of joints for a house soil pipe.
10. Sketch a street basin used in the combined system of sewerage.
11. Sketch a lamp hole used in the separate system of sewerage.
12. Write Kutter's formula, and explain the meaning of each letter.
13. Give sketches showing the arrangement of the sewage purification works at East Orange, N. J. (These works were visited by the class.)
14. Give characteristics of the seven kinds of water used in Bethlehem and South Bethlehem.
15. Give methods, cost, and results of the drainage of Haarlem Lake.

During the Senior year a course in Hydraulics is given which treats of the flow of water through orifices, over weirs and in tubes and pipes. The principles of canal and river hydraulics are here discussed, as also those of naval hydrodynamics and of water-wheels and turbines. Several classes have had the opportunity to make experiments on the flow of water over weirs and through orifices, as also tests of the power and efficiency of a turbine wheel.

It will be seen from the titles of the theses given on page 13 that many students become highly interested in sanitary and hydraulic work. It may also be said that this branch of engineering is one whose importance is daily becoming greater, and that many recent graduates are making it a specialty.

VIII. Bridge Engineering.

The subject of Roofs and Bridges is taken up at the middle of the Junior year, and continued until the end of Senior year. Stresses in simple trusses first receive attention, all the different types being carefully analyzed and the computations made in the manner required by the most recent specifications. The graphic analysis of stresses is also taught in detail, different problems being assigned to each student. Numerous bridges in the Lehigh Valley are visited and inspected,

so that clear, concrete ideas of each type of truss, as well as of the details of construction, may be obtained.

The work in Bridge Design is begun by the study of the history of the development of trusses and by the inspection, measurement and computation of a structure, the class being divided into parties of two men and each party having a separate bridge to examine and report upon. Designs for two or three structures are then made by each student, the data being different for each, and the computations, general plans, and estimates of weight and cost are worked out in the same manner as in the office of a bridge company. A roof truss, a plate-girder, and a pin-connected bridge were thus designed by each member of the class of 1896, while in the previous year a riveted lattice-girder was taken instead of the roof-truss. A detailed account of the manner of conducting this class work is given in Chapter VIII of Part III of Merriman & Jacoby's Text-Book on Roofs and Bridges, where also may be seen on Plate VI a reproduction on a reduced scale of one of the designs made by a member of the class of 1893.

The higher forms of structures, including cantilever, draw, continuous, suspension and arched bridges receive detailed attention by lectures and text-books. The following examination paper, given on December 12, 1895, illustrates the nature of this work:

1. Find the stresses in a Ferris wheel with six tensile spokes.
2. State the principle of least work and apply it to the deduction of the formula for the deflection of a simple truss.
3. Find the reactions of a continuous beam of two equal spans due to a load P at the middle of the first span. Draw the shear and moment diagrams.
4. Sketch a rim bearing and a center bearing turn-table for a swing bridge.
5. Explain, with sketch, a partially continuous truss.
6. Sketch the cantilever truss at Easton, Pa. (This structure was visited by the class during erection.)
7. State the position of the live load which causes the maximum and minimum stresses in one of the chord members of the shore span of a cantilever truss.
8. Give an outline of the life and work of John A. Roebling.
9. Find the ratio of the least to the greatest stress in the cable of a suspension truss when the deflection is one-tenth of the span.
10. Find, for a suspension truss having a central hinge, the reactions due to a partial load. Draw the shear and moment diagrams.

11. Describe, with sketches, the three classes of metallic arches.

12. Show, for an arch with three hinges, the position of the live load to produce the maximum stress in one of the web members.

IX. Allied Technical Subjects.

A number of courses of instruction are given by other departments to all students in Civil Engineering, in order that proper knowledge and training in closely allied subjects may be secured. The privilege to a student of coming into contact with many instructors, each of whom is an expert in his specialty, is, indeed, a great one, and an examination shows that the present Senior class in Civil Engineering has received, during the four years of the Course, instruction from more than twenty-five different teachers in the several departments of the University.

The Department of Mineralogy gives during the Junior year courses in crystallography and mineralogy. The greater part of the time is devoted to practical exercises in the determination of crystals and minerals, and each student is enabled to become familiar with the common kinds by handling and testing several hundred specimens. This work is of great value in training the powers of observation, as well as in imparting knowledge likely to be of use to every field engineer.

The Department of Mining Engineering gives during the Senior year courses in lithology and geology, the first rendering the student familiar with the composition of rocks and enabling him to determine them at sight, while the second is devoted to historic and dynamic features of the geological formations with special reference to the needs of mining engineers.

The Department of Mechanical Engineering gives during the Senior year a course in mechanics of machinery, including pile-drivers, cranes, and elevators, and the mechanics of the locomotive. Visits to the works of the Bethlehem Iron Company in South Bethlehem and to the shops of the Lehigh Valley Railroad at Easton are made.

The Department of Astronomy gives during the Senior year two courses in astronomy, the first being descriptive and gene-

ral, while the second is on the practical astronomical operations of geodetic and boundary surveys. Each student takes observation for time, azimuth and latitude in the Sayre Observatory, adjusts and reduces his notes, and makes in full the necessary computations. This work is of special value in giving training in precise measurement and accurate computation.

The Department of Electrical Engineering also gives during the Senior year a course in electric railways which treats of the generation of electric power, its distribution, motors for electric cars, and the equipment and operation of trolley roads. Visits of inspection to power stations and electric light plants are made, while the dynamos in the electrical laboratory afford opportunity for special experiments.

X. Theses.

The topics for theses are chosen at the beginning of the second term of the Senior year, subject to the approval of the Professor of Civil Engineering. During that term the equivalent of four exercises per week is allowed for the preparation of theses. Advice is given in regard to general lines of treatment and references to literature are indicated, but in the main the student is thrown upon his own resources, and the thesis is regarded as a part of the final examination for the degree of Civil Engineer.

The following are the titles of the theses of the civil engineers of the class of 1895:

A topographic map and industrial survey of the country within three miles of Lehigh University.

Determination of co-ordinates by the three-point problem.

Determination of errors of eccentricity and graduation in three engineers' transits.

The manufacture of bricks, particularly in the Lehigh Valley.

Plan for the location and construction of a highway between Bethlehem and Allentown, Pa.

A proposed electric railway from Bethlehem to Nazareth, Pa.

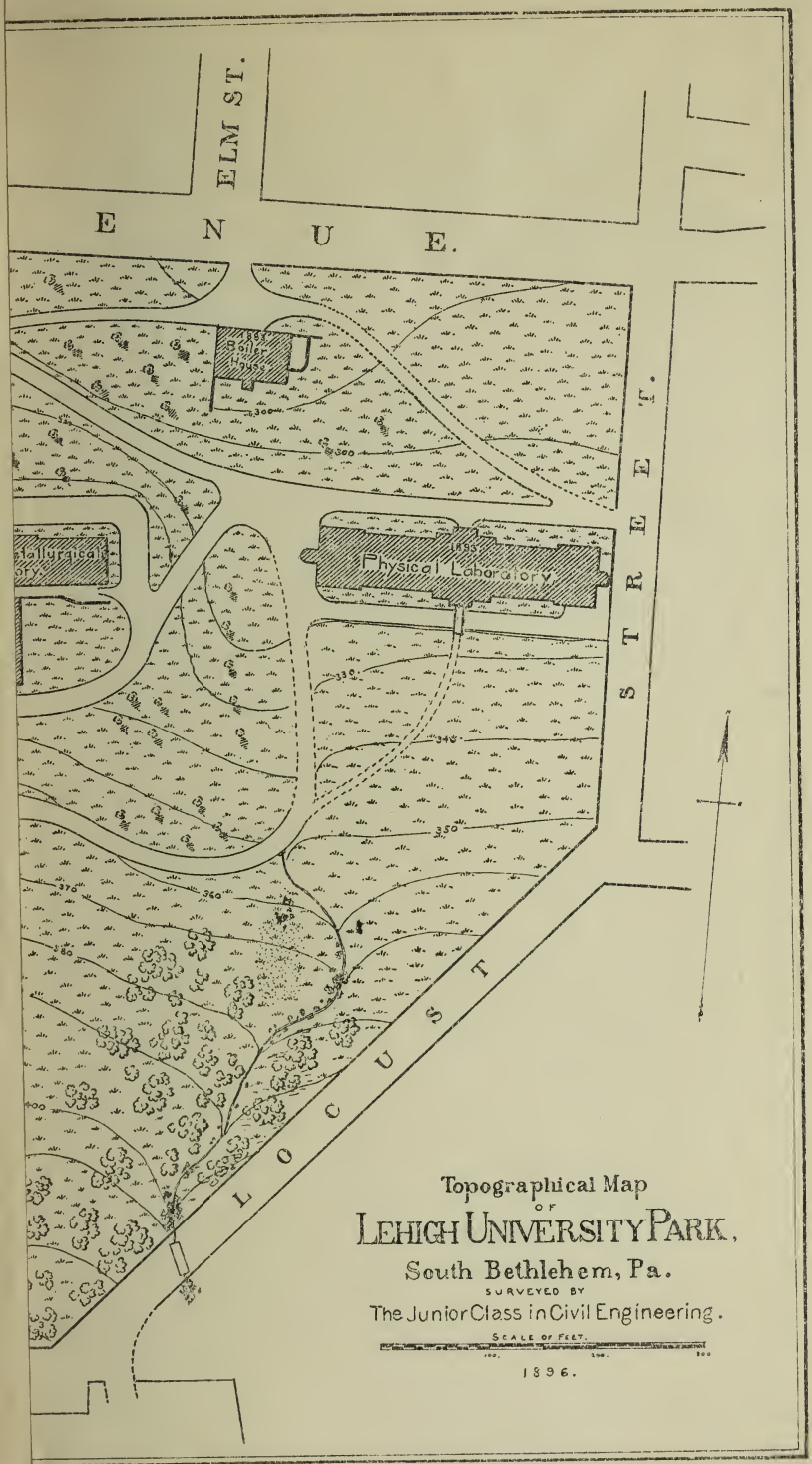
The narrow gauge railroad at Mt. Gretna, Pa.

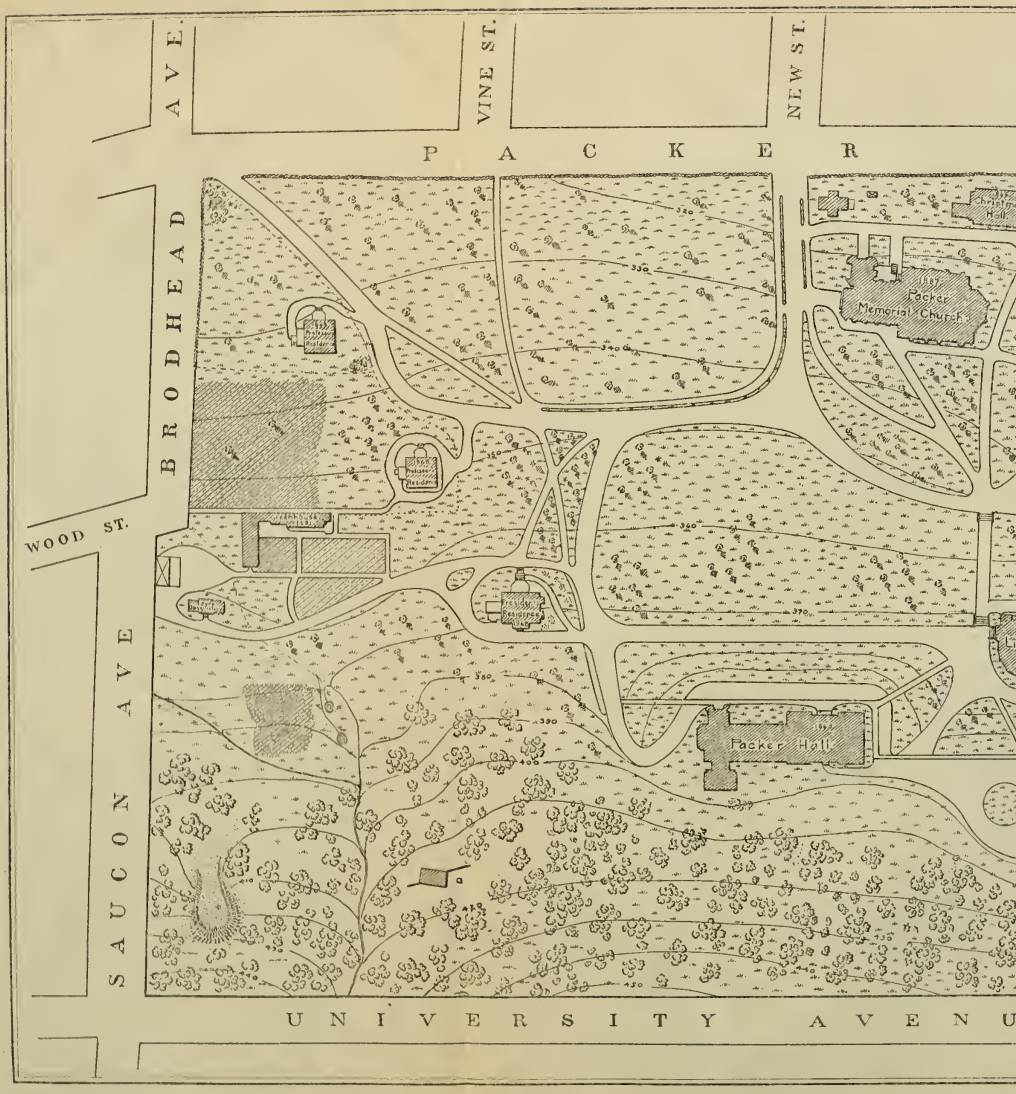
The drainage and improvement of Broad Street, South Bethlehem, Pa.

Designs and estimates for several retaining walls, 30 feet high.

Design and estimate for railroad track and coal tipple at Brockwayville, Pa.
Investigation of the stability of the new dam at Holyoke, Mass.
The masonry dams of the State of Pennsylvania.
Plan for a water supply for Duncannon, Pa.
Systems of water supply for irrigation in Mexico.
Investigation of a dam for reservoir D at Carmel, N. Y.
Plan for a water supply for the Lehigh University.
The utilization of the water power of the Lehigh River.
Design for a hydraulic plant for an electric light station for the Lehigh University.
The turbine as a water meter.
Design for a sewerage system for Chillicothe, Ohio.
Review of the sewerage system of Bradford, Pa.
Design for a sewerage system for Flemington, N. J.
Design for a sewerage system for Elkton, Md.
Design for a system of sewers for Manchester, Va.
Design for a separate system of sewerage for West Bethlehem, Pa.
Design for a combined system of sewerage for South Bethlehem, Pa.
Design for a separate system of sewerage for South Bethlehem, Pa.
Review of the Penn Street bridge, Reading, Pa.
Design for a parabolic bowstring truss at Freemansburg, Pa.
Review of a highway bridge over the Susquehanna River at Bloomsburg, Pa.
Design for a bridge over the Lehigh River, Freemansburg, Pa.
Experiments and computations on the deflection of a bridge truss.
Discussion of the temperature stresses in a highway deck Pratt truss at Hokendauqua, Pa.
Determination of the exact reactions and stresses in a drawbridge truss.
Design for an overhead crossing for the Northern Central Railroad at Williamsport, Pa.
Comparison of four Pratt trusses with odd and even numbers of panels, with respect to economy of material.

These theses give full details of all the surveys, measurements and experiments required in obtaining the data, the discussions and computations, and numerous drawings and estimates. Each student not only derives from his thesis most valuable training, but great advantages result from the discussions arising from the theses of others. Many of these questions form the subject of papers which are read and discussed by the students at the meetings of their technical societies, and they are thus led to take an earnest interest in all the scientific and economic problems that engage the attention of the engineering profession.


ELM ST.
E N U E.
STREET.
Physical Laboratory
LOCUST
Topographical Map
OF
LEHIGH UNIVERSITY PARK,
South Bethlehem, Pa.
SURVEYED BY
The Junior Class in Civil Engineering.
SCALE OF FEET.
1896.


AVE.
VINE ST.
NEW ST.
P A C K E R
BRODHEAD
WOOD ST.
SAUCON AVE
Packer Memorial Church
Packer Hall
U N I V E R S I T Y A V E N U

XI. Statistics of Alumni.

The number of graduates of Lehigh University is 788, of whom 751 are living. The following table gives the total number of graduates for each year, the number of graduates in civil engineering and the percentage of these to the total. In eight cases men have, by taking one or two years of extra study, obtained degrees in two courses; this will explain why the grand total of the table is greater by eight than the number of alumni.

Year.	Total Number of Graduates.	Graduates in Civil Engineering.	Percentage of Graduates in Civil Engineering.
1869	3	1	33.3
1870	11	3	27.3
1871	7	2	28.6
1872	10	7	70.0
1873	5	1	20.0
1874	5	5	100.0
1875	9	6	66.7
1876	12	6	50.0
1877	9	8	88.9
1878	11	4	36.4
1879	4	2	50.0
1880	11	2	18.2
1881	6	0	0.0
1882	8	4	50.0
1883	29	6	20.7
1884	24	10	41.7
1885	18	9	50.0
1886	36	9	25.0
1887	45	14	31.1
1888	61	34	55.7
1889	61	16	26.2
1890	51	27	52.9
1891	46	19	41.3
1892	58	18	31.0
1893	60	24	40.0
1894	82	22	26.8
1895	114	36	31.6
Grand total,	796	295	37.06

THE LEHIGH UNIVERSITY.

SOUTH BETHLEHEM, PENNSYLVANIA.

THOMAS MESSINGER DROWN, LL.D., President.

COURSES IN GENERAL LITERATURE.

1. THE CLASSICAL COURSE.
2. THE LATIN-SCIENTIFIC COURSE.
3. THE COURSE IN SCIENCE AND LETTERS.

COURSES IN TECHNOLOGY.

1. THE COURSE IN CIVIL ENGINEERING.
2. THE COURSE IN MECHANICAL ENGINEERING.
3, 4. THE COURSES IN MINING ENGINEERING AND METALLURGY.
5. THE COURSE IN ELECTRICAL ENGINEERING.
6. THE COURSE IN ANALYTICAL CHEMISTRY.
7. THE COURSE IN ARCHITECTURE.

The University is situated at South Bethlehem, on the Lehigh River, at the junction of the Lehigh Valley, the New Jersey Central, and the Reading (North Pennsylvania) Railroads. New York is ninety-two and Philadelphia fifty-seven miles distant.

Entrance examinations are held at the University in June and September. Arrangements will be made for local examinations at various points in June, with reference to which information will be furnished on application.

It is regarded as highly desirable that the examiners should receive from principals of preparatory schools statements with reference to those whom they send up as candidates for entrance, indicating as clearly and fully as possible, in each case, the teacher's opinion of the candidate's character and scholarship and fitness for entering upon collegiate work; and such statements will receive careful consideration in connection with the results of the entrance examinations.

For further information, for Registers, and for descriptive Circulars of the different Courses, address

THE PRESIDENT OF LEHIGH UNIVERSITY,
SOUTH BETHLEHEM, PA.